



Air Force Research Laboratory|AFRL

Science and Technology for Tomorrow's Air and Space Force

Success Story

MUNITIONS DIRECTORATE TRANSITIONED EXPLOSIVE FORMULATION WITH SIGNIFICANT CHARACTERISTICS TO THE ARMY



The Munitions Directorate transitioned an optimized explosive formulation with a patented wax-based binder system. The Army elected to incorporate the newly created PAX/AFX-196 into all of their self-propelled Howitzer artillery projectiles. By eliminating a proprietary foreign source of supply, directorate researchers saved approximately \$7 million in licensing fees and an additional \$30 million in a capital investment to outfit the designated Army Ammunition Plant with the ability to load M107/M795 shells with a plastic-bonded explosive.



Air Force Research Laboratory
Wright-Patterson AFB OH

Accomplishment

Directorate researchers chose to combine a nearly identical explosive formulation (AFX-194A) with a fluid energy milled (FEM) cyclotrimethylenetrinitramine (RDX) produced at Holston Army Ammunition Plant. By incorporating the FEM RDX (coated with a plasticizer that eliminates additional drying and handling costs during processing of the composite formulation) into an optimized variant of AFX-194A, designated PAX/AFX-196, researchers produced a dramatic increase in manufacturability and yielded shock sensitivities nearly equivalent to that obtained in the original formulation produced with foreign source material. Additionally, to minimize the tendency to crack during thermal cycling, researchers altered the patented wax binder system to incorporate increased levels of plasticizer.

Background

The directorate's new explosive formulation was used in the Army M107 and M795 155 mm self-propelled Howitzer projectiles. Initially, the Army selected a standard Army/Air Force high-explosive formulation (PAX/AFX-194 Type I), recrystallized by a proprietary foreign source method that displayed excellent insensitive munitions characteristics.

However, during a 12-month aging study, the new formulation displayed shock sensitivities twice as sensitive as those previously determined when compared to baseline charges of PAX/AFX-194 Type I. Researchers determined the recrystallization process caused the problem.

Munitions
Support to the Warfighter

Additional information

To receive more information about this or other activities in the Air Force Research Laboratory, contact TECH CONNECT, AFRL/XPTC, (800) 203-6451 and you will be directed to the appropriate laboratory expert. (04-MN-03)